

DETAILED ACTION

Response to Amendment

1. The declaration filed on 29 October 2007 under 37 CFR 1.131 is sufficient to overcome the Huang reference reference.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-4, 7, 8, 10-12 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sodha (USPN 5057254) in view of Kalnins (USPN 4252513). **As to Claim 1**, Sodha teaches:

Combining carbon-containing fibers (1:67-68) and a carbonizable matrix of coal pitch (2:20-21) which is submitted to be thermoplastic;

Heating the mixture to a sufficient temperature to melt at least a portion of the matrix material (2:19-21);

While heating the mixture, applying a pressure of at least 35 kg/cm² to the mixture to form a compressed composite material (3:30-33).

Sodha is silent to (a) the friction additive and (b) applying an electric current to the mixture to generate heat within the mixture.

However, Kalnins teaches (a) using a friction additive (4:48) and (b) applying an electric current to the mixture to generate heat within the mixture (3:60-4:3 and column 2).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Kalnins into that of Sodha because (a) Sodha's method is to be used for making brakes (1:13) and the friction modifier of Kalnins would increase the lifetime of the article or adjust its friction, producing desirable brakes, therefore Kalnins suggests the combination with Sodha, and (b) the method of Kalnins ensures uniform heating (1:30-34) which would be desirable in producing brakes in order to produce articles having uniform shapes and mechanical properties, and the combination with Sodha is merely the application of a known technique or method to improve a similar process. **As to Claims 2-4**, Kalnins teaches at least silica (4:45-48). **As to Claim 7**, Sodha specifically teaches a hot pressing temperature of 700 C (5:13), and it is noted that Sodha provides the process conditions of Claim 1, namely the pitch, carbon fibers, and compression pressure. Thus it is submitted that by providing all the process variables, fabrication of the claimed density would be implicit. Although Sodha is silent to the thirty minutes, it is submitted that this recitation is not limiting because it does not recite that the heating time is 30 minutes, but only that a compressed material having the claimed density is formed within thirty minutes. Thus, by providing the claimed process conditions, the method of Sodha would have formed a compressed composite material within thirty minutes as claimed. **As to Claim 8**, Sodha teaches pitch and PAN carbon fibers (2:27-30, 6:64). **As to Claim 10**, Sodha teaches that a ramping temperature may be used (5:19-25, for example), and in ramping from low temperature to high temperature using the method of Kalnins it would be implicit to use a first power level and then to increase the power level to

reach the next temperature. **As to Claim 11**, Sodha teaches the claimed range of carbon fibers and carbonizable material (3:22-28). Kalnins teaches that the friction modifier can be used at a percentage between 3-30% (4:35-5:5). **As to Claim 12**, Sodha teaches increasing the density by introducing a carbonizable material into the voids and baking to achieve the claimed density (6:27-37). **As to Claim 19**, Sodha teaches a method of forming a composite material suitable for brakes comprising:

- (a) compressing a mixture of carbon fibers and coal pitch (2:20) which is implicitly thermoplastic;
- (b) heating to a temperature of at least 500 C to form a compressed preform (3:31);
- (c) introducing a carbonizable material into the compressed preform to form an impregnated preform (4:4-6, 6:3-6);
- (d) baking to carbonize (6:5-10)
- (e) repeating impregnation (7:18-20)
- (f) graphitizing (Abstract) at a temperature of at least 1500 C (4:33, 3:29-33) to form a graphitized preform having a density of at least about 1.7 g/cm³ (5:25-27, 6:36).

Sodha is silent to (a) the friction additive and (b) applying an electric current to the mixture to generate heat within the mixture.

However, Kalnins teaches (a) using a friction additive (4:48) and (b) applying an electric current to the mixture during the step of compressing to generate heat within the mixture (3:60-4:3 and column 2).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Kalnins into that of Sodha because (a) Sodha's

method is to be used for making brakes (1:13) and the friction modifier of Kalnins would increase the lifetime of the article or adjust its friction, producing desirable brakes, therefore Kalnins suggests the combination with Sodha, and (b) the method of Kalnins ensures uniform heating (1:30-34) which would be desirable in producing brakes in order to produce articles having uniform shapes and mechanical properties, and the combination with Sodha is merely the application of a known technique or method to improve a similar process.

3. **Claims 5 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sodha (USPN 5057254) in view of Kalnins (USPN 4252513), and further in view of Heitman (USPN 3254143) and Ho (USPN 5037626). Sodha and Kalnins teach the subject matter of Claim 2 above under 35 USC 103(a). **As to Claim 5**, Sodha and Kalnins are silent to converting the disclosed oxide (silica) to a carbide by heat treating the compressed composite material at an elevated sufficient temperature. However, Heitman teaches that it is known to combine oxides such as silica (7:30-75) with a pitch binder (4:27-34) for the purpose of converting to carbides (7:30-71). Ho provides motivation for one of ordinary skill in the art to make the combination because silicon carbide is a high strength material having good chemical stability, excellent oxidation resistance, and because the mixture of a carbonizable matrix and silica (2:10-28) can induce a reaction which produces a relatively large proportion of silicon carbide whiskers (2:24-28), which are a much more effective reinforcement in composites than particulates (1:18-20), which would be desirable in the method of Sodha. **As to Claim 6**, Sodha teaches that a pitch primary formed product (5:63-6:1) may be impregnated with carbonizable material (6:3-5).

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4. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Sohda (USPN 5523035) in view of Kalnins (USPN 4252513) and further in view of Hatch (USPN 4166145). Sodha and Kalnins teach the subject matter of Claim 1 above under 35 USC 103(a). This alternative rejection is set forth to address the interpretation of Claim 7 where thirty minutes is interpreted to be a required variable of the process. **As to Claim 7**, Sodha specifically teaches a hot pressing temperature of 700 C (5:13), and it is noted that Sodha provides the process conditions of Claim 1, namely the pitch, carbon fibers, and compression pressure. Thus it is submitted that by providing all the process variables, fabrication of the claimed density would be implicit. Sodha is silent to the claimed thirty minutes. However, Hatch clearly teaches that temperature ramp and time clearly represent result effective variables (5:16-19, 6:12-17, 6:23-37). In view of Hatch's teachings, one of ordinary skill would have found it *prima facie* obvious to optimize the heating time. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Hatch into that of Sodha because Sodha suggests fabrication of brakes (1:13) and Hatch teaches the process variables as suitable for brakes (1:20), and because doing so would produce a dense composite having desirable properties including high temperature oxidation resistance (1:15-17).

5. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Sohda (USPN 5523035) in view of Kalnins (USPN 4252513) and further in view of Klett (USPN 5744075). Sodha and Kalnins teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claim 9**, Sodha is silent to powdered pitch. However, Klett teaches powdered pitch (4:59-65) and polyacrylonitrile carbon fibers (4:59-65). It would have been *prima facie* obvious to one of

ordinary skill in the art at the time of the invention to incorporate the method of Klett into Sodha because Klett provides a desirable composition for brakes (2:5), the product of Sodha (1:13) and because Klett's method provides would help evenly distribute the binder material.

Response to Arguments

6. Applicant's arguments filed 29 October 2007 and 11 March 2008 have been fully considered. The arguments appear to be on the following grounds:
 - a) Huang is not proper prior art.
 - b) With respect to the rejection of Claim 7, it is respectfully asserted that since Claim 7 depends from Claim 1, shown to be allowable over the Huang reference, Claim 7 should likewise be found allowable.
7. These arguments are not persuasive or moot for the following reasons:
 - a) This argument is persuasive, and the rejection has been withdrawn above.
 - b) The argument appears to respond incorrectly to the rejection of Claim 7. However, the letter mailed 11 January 2008 cites to rejections on Page 7 of the non-final action, and not to Claim 7. A second rejection was made over Sodha and Kalnins since rejections that are likely to be antedated by a 37 CFR 1.131 affidavit or declaration should be backed up by the best other art rejections available. See MPEP 706.02(I). These rejections are maintained.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. DANIELS whose telephone number is (571)272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Matthew J. Daniels/
Primary Examiner, Art Unit 1791
6/3/08